

(PRIOR ART)

Fig. 1

# Spectra for Depth Profile of Charging $\text{SiO}_2$ on Si (Si KLL Auger Spectra) (PRIOR ART)

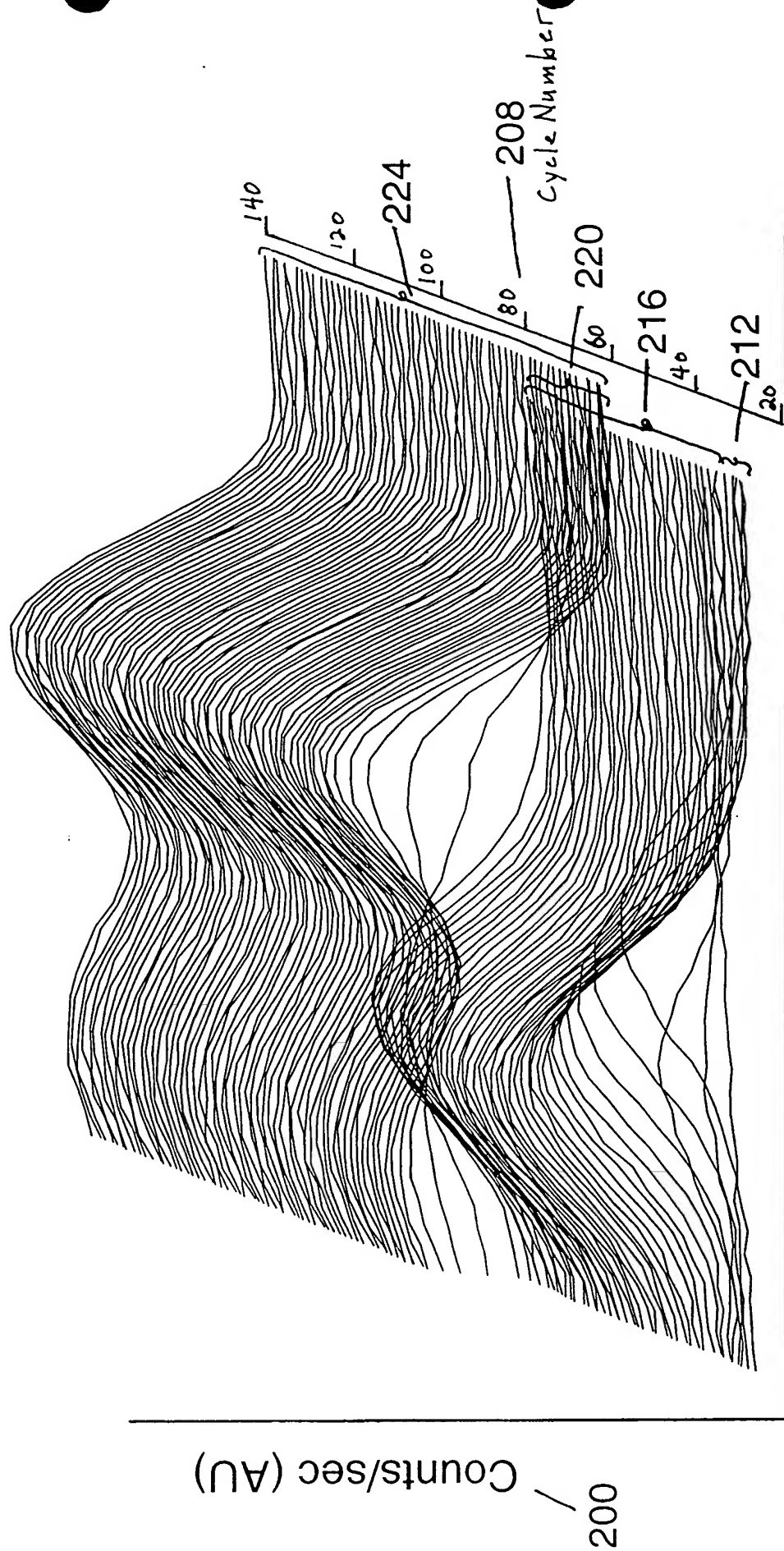


Fig. 2

# Profiles of Scaled Target-Factor Weighting Factors from Factor Analysis of Uncompensated Auger Spectra from Charging SiO<sub>2</sub> on Si Substrate (PRIOR ART)

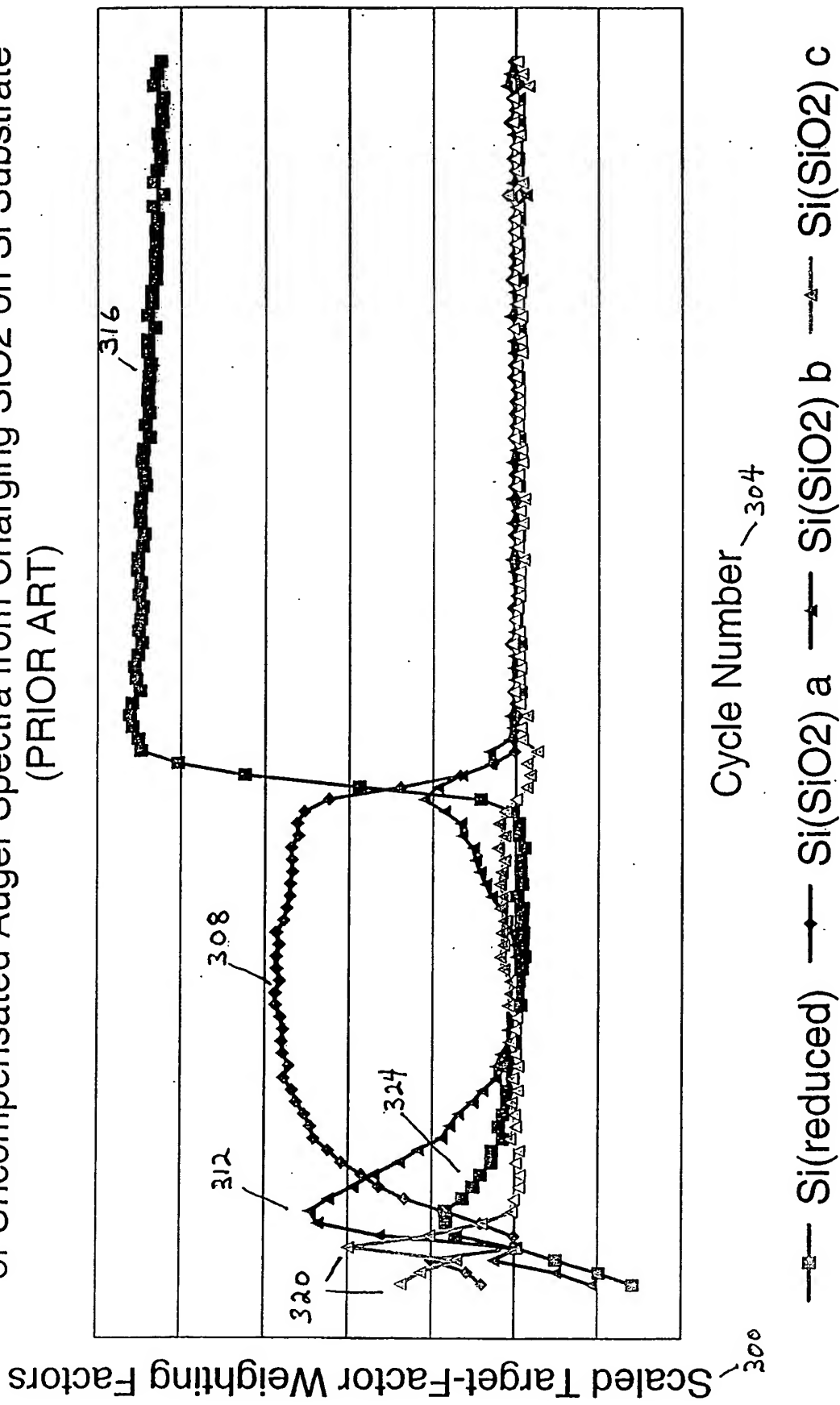


Fig. 3

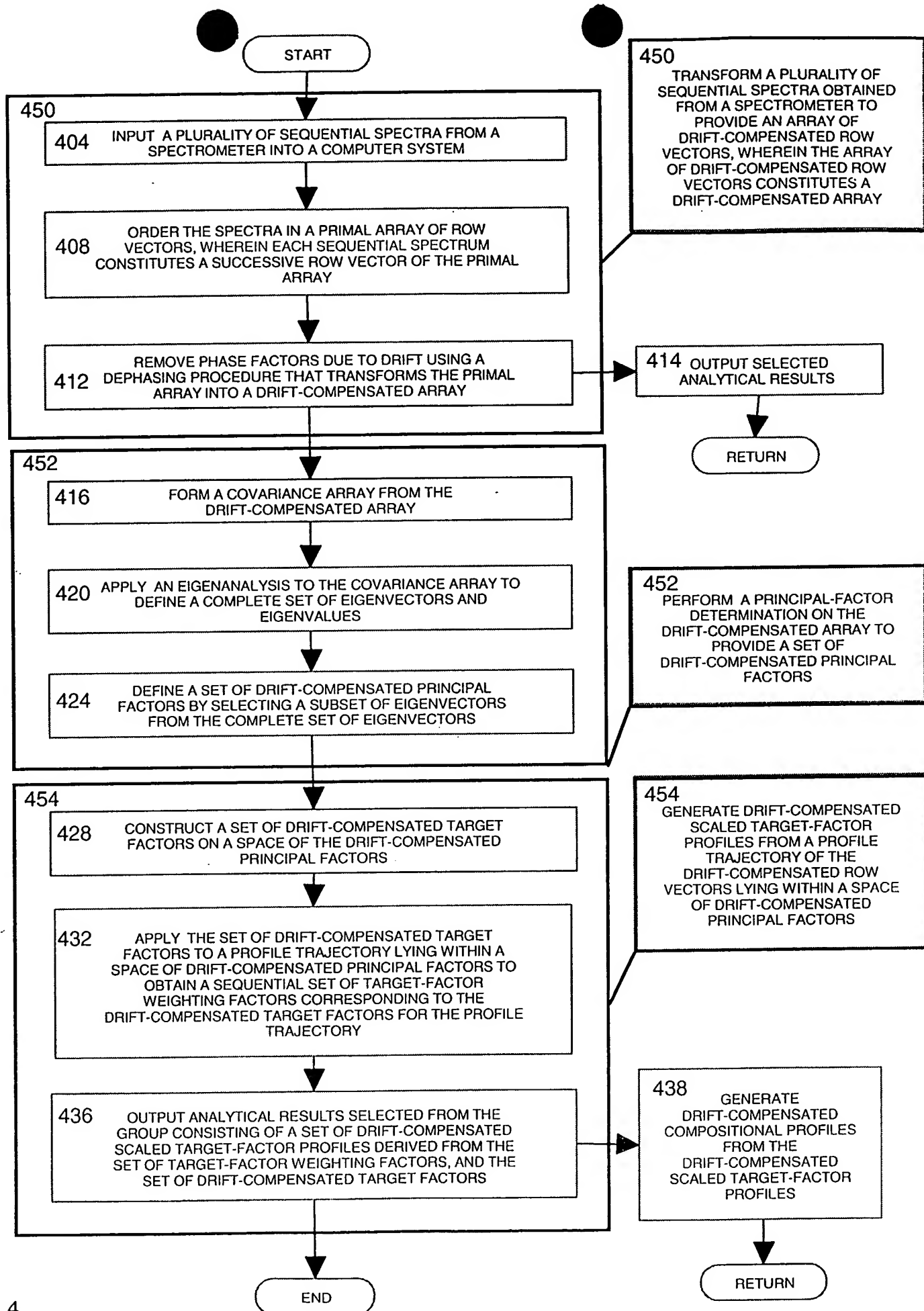


Fig. 4

# Moduli of Fourier-transformed Spectra for Depth Profile of Charging SiO<sub>2</sub> on Si

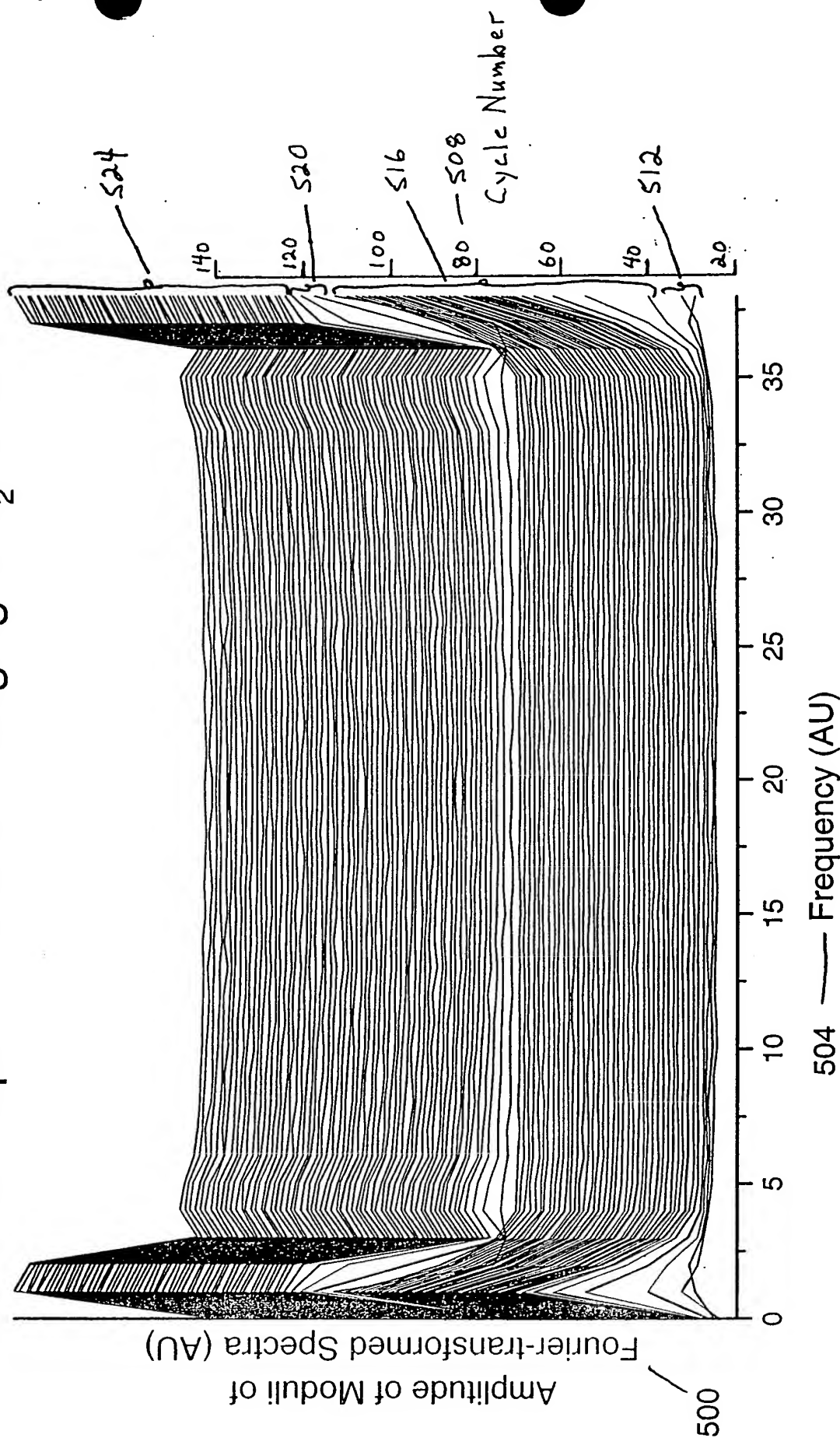


Fig. 5

# Profiles of Scaled Target-Factor Weighting Factors from Factor Analysis of Moduli of Fast-Fourier-Transformed Auger Spectra from Charging SiO<sub>2</sub> on Si Substrate

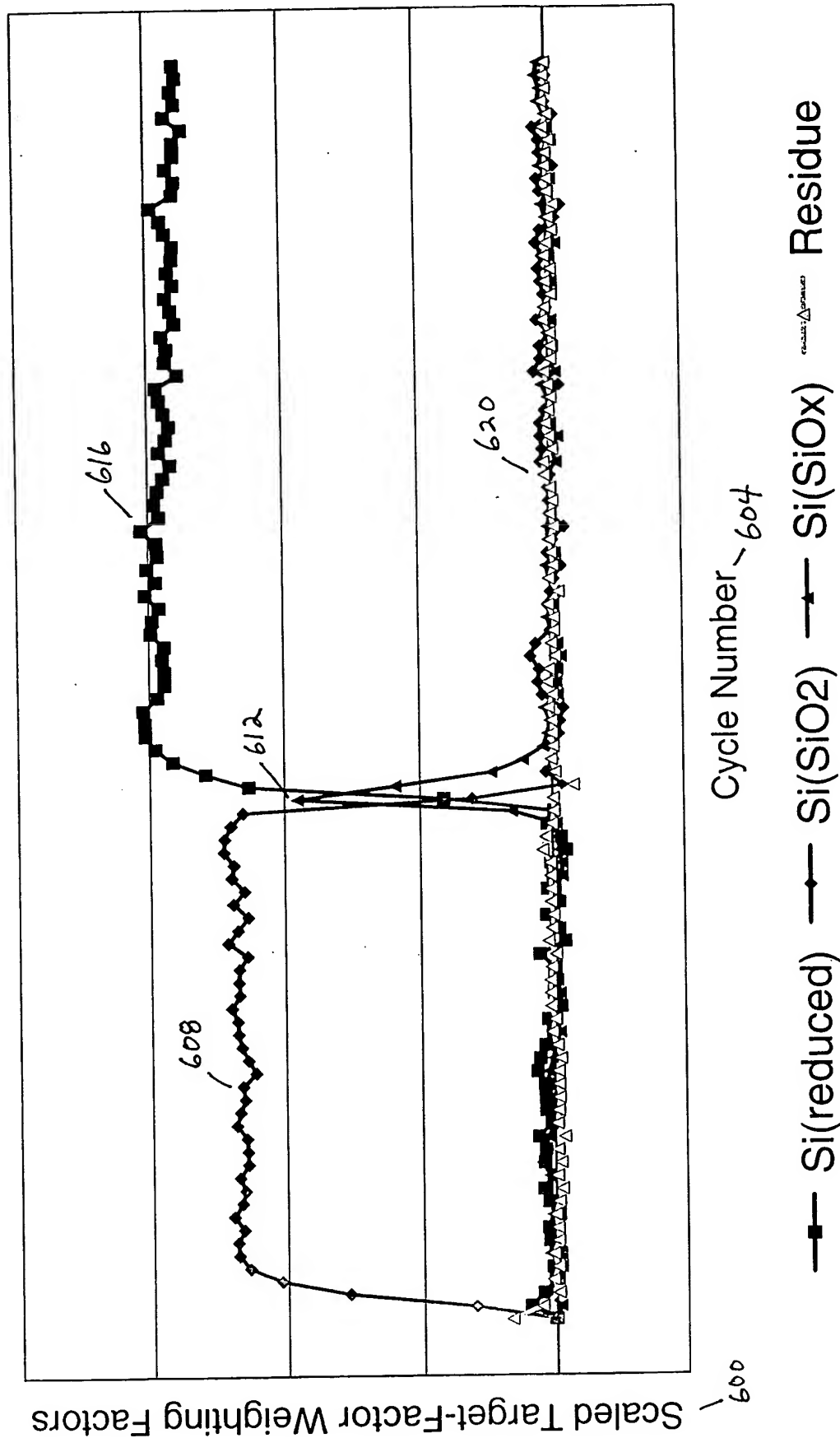


Fig. 6

# Drift-Compensated Spectra Synthesized from Selected Reference Spectra Fit to Primal Spectra for Depth Profile of Charging $\text{SiO}_2$ on Si

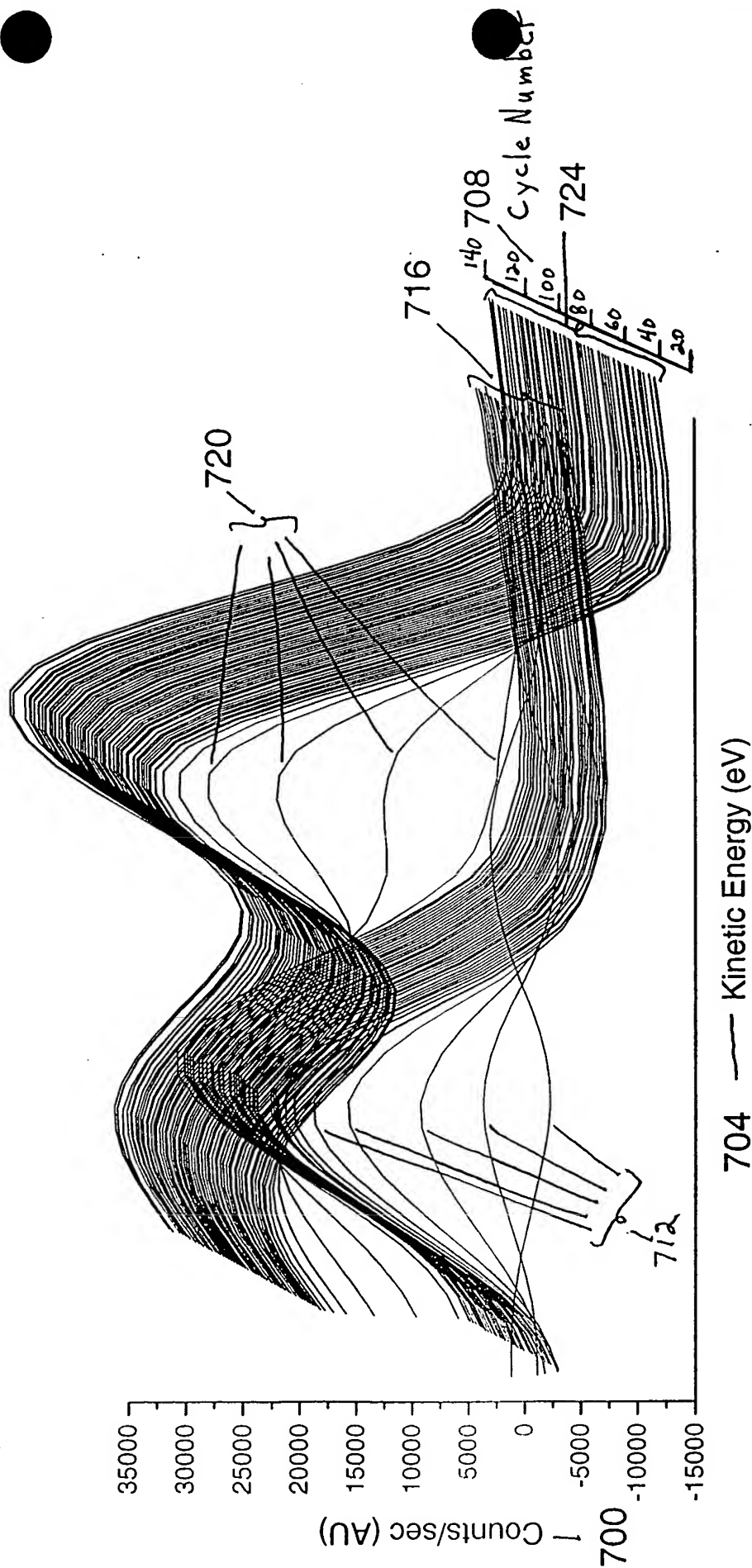


Fig. 7

# Profiles of Scaled Target-Factor Weighting Factors from Nonlinear-Least-Squares Fitting of Selected Reference Spectra to Primal Spectra and Profile of Principle Residue Weighting Factor from Eigenanalysis of Residues

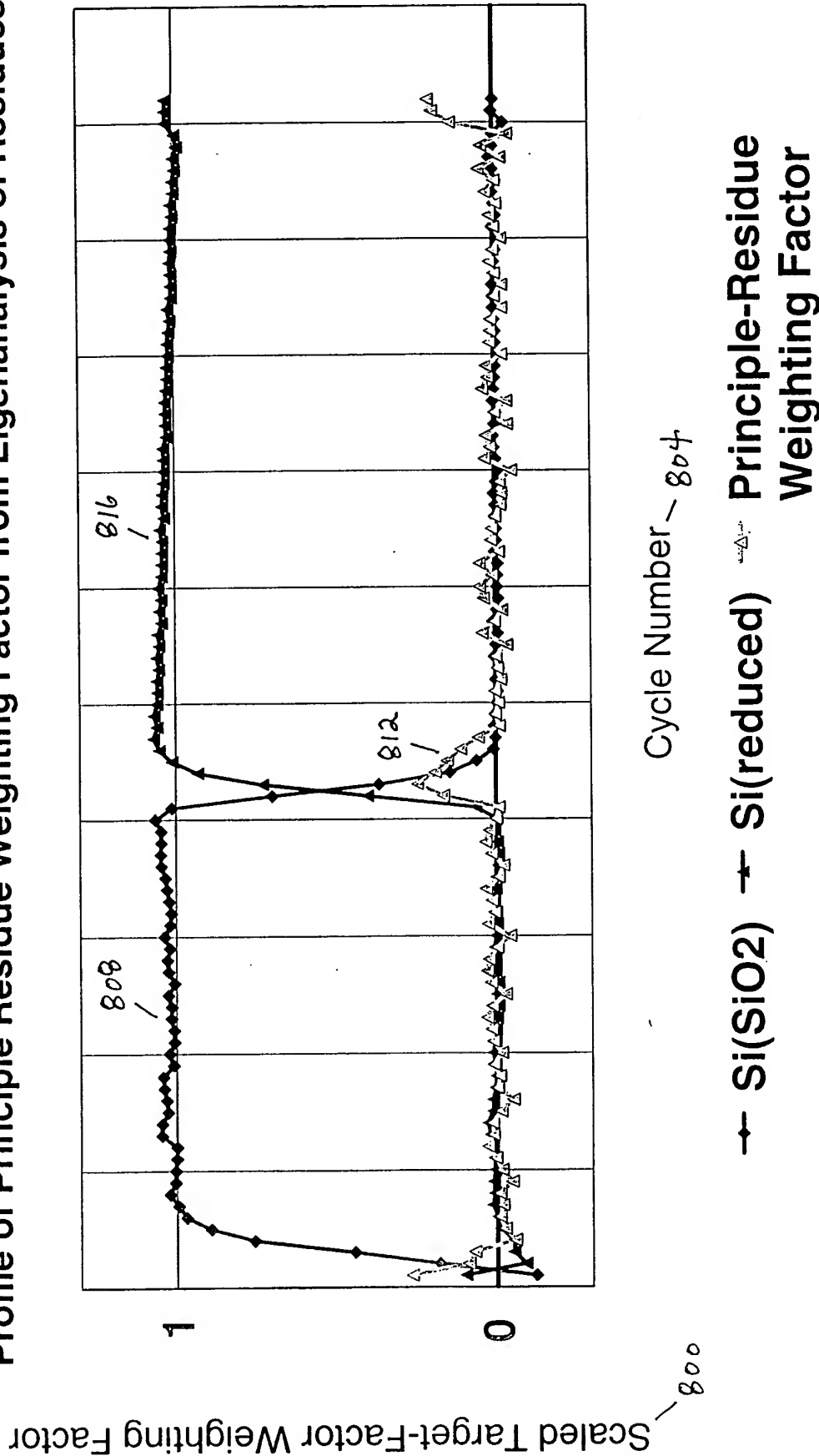


Fig. 8

## Profiles of Phase Factors for Selected Reference Spectra Obtained from Fitting to Primal Spectra

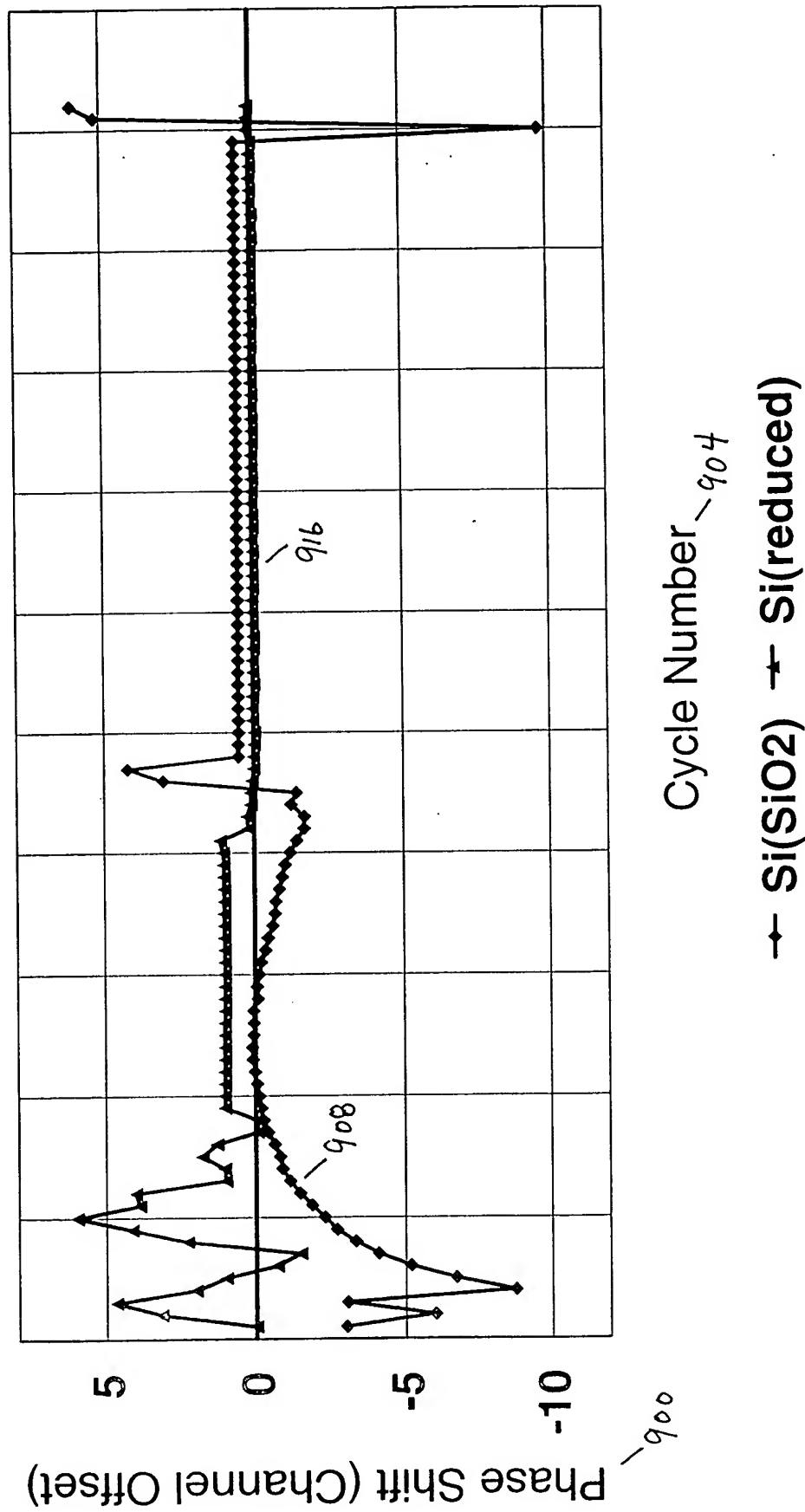


Fig. 9

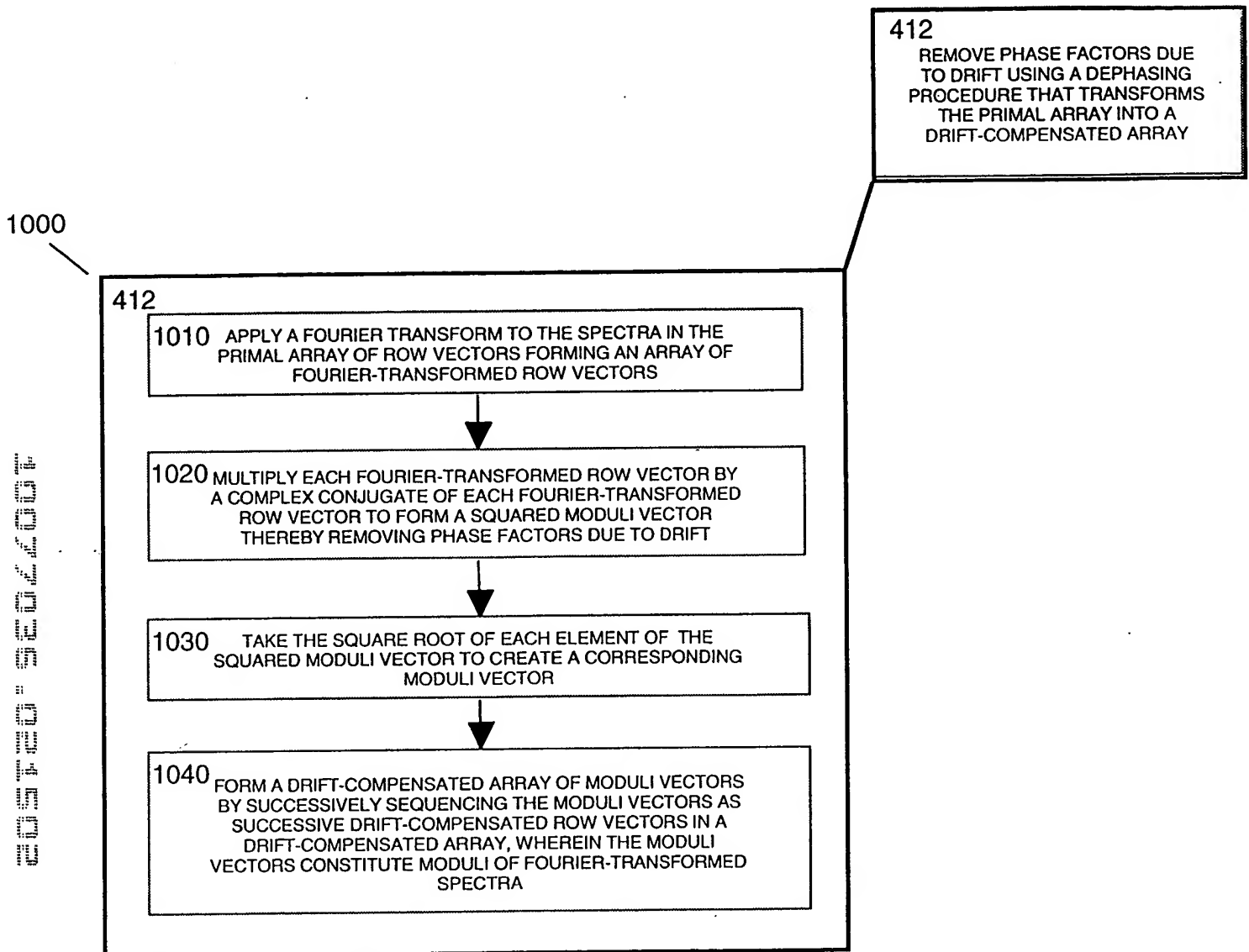


Fig. 10

1100

412

REMOVE PHASE FACTORS DUE  
TO DRIFT USING A DEPHASING  
PROCEDURE THAT TRANSFORMS  
THE PRIMAL ARRAY INTO A  
DRIFT-COMPENSATED ARRAY

412

1110 APPLY A FITTING PROCEDURE TO EACH SPECTRUM IN THE  
PRIMAL ARRAY USING SELECTED REFERENCE SPECTRA



1120 CALCULATE THROUGH THE FITTING PROCEDURE A  
CORRESPONDING REFERENCE WEIGHTING FACTOR FOR  
EACH REFERENCE SPECTRUM CORRESPONDING TO EACH  
SPECTRUM IN THE PRIMAL ARRAY



1130 REMOVE THE PHASE FACTOR DUE TO DRIFT FROM EACH  
SPECTRUM IN THE PRIMAL ARRAY BY SYNTHESIZING A  
CORRESPONDING DRIFT-COMPENSATED SPECTRUM GIVEN  
BY THE SUM OF EACH SELECTED REFERENCE SPECTRUM  
MULTIPLIED BY THE CORRESPONDING REFERENCE  
WEIGHTING FACTOR



1140 FORM A DRIFT-COMPENSATED ARRAY BY SUCCESSIVELY  
SEQUENCING THE DRIFT-COMPENSATED SPECTRA AS  
SUCCESSIVE DRIFT-COMPENSATED ROW VECTORS IN THE  
DRIFT-COMPENSATED ARRAY

Fig. 11

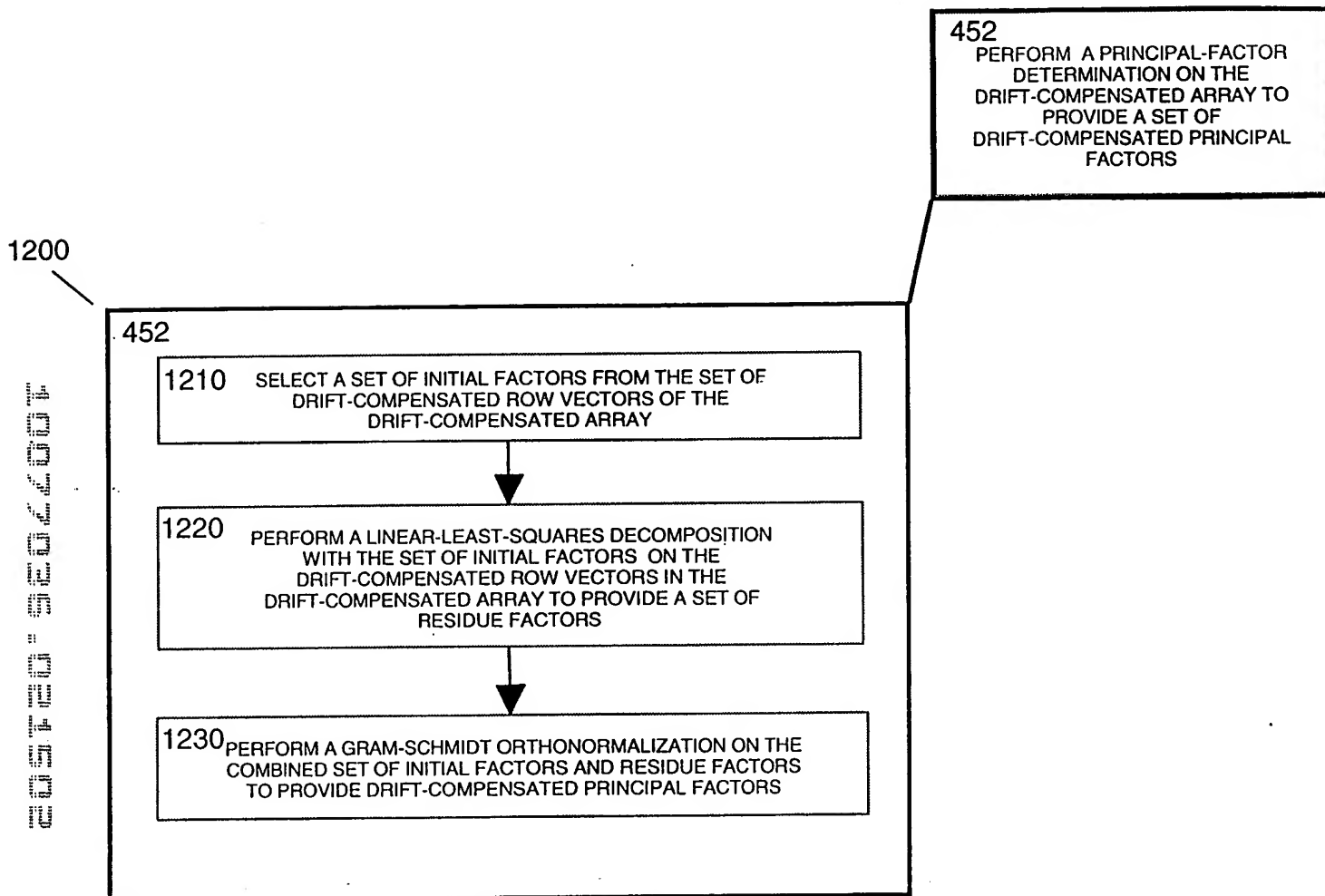


Fig. 12

1300

428 CONSTRUCT A SET OF  
DRIFT-COMPENSATED TARGET  
FACTORS ON A SPACE OF THE  
DRIFT-COMPENSATED PRINCIPAL  
FACTORS

428

1310 GENERATE A PROFILE TRAJECTORY ON A 3-DIMENSIONAL  
PROJECTION OF A 4-DIMENSIONAL SPACE OF A SET OF  
FIRST-FOUR, DRIFT-COMPENSATED PRINCIPAL FACTORS  
ALONG WITH A REFERENCE TETRAHEDRON THE VERTICES  
OF WHICH REPRESENT EACH OF THE FIRST-FOUR,  
DRIFT-COMPENSATED PRINCIPAL FACTORS



1320 ENCLOSE THE PROFILE TRAJECTORY WITHIN AN  
ENCLOSING TETRAHEDRON WITH VERTICES CENTERED ON  
END-POINTS AND IN PROXIMITY TO TURNING POINTS OF THE  
PROFILE TRAJECTORY, AND WITH FACES LYING  
ESSENTIALLY TANGENT TO PORTIONS OF THE PROFILE  
TRAJECTORY



1330 CALCULATE THE DRIFT-COMPENSATED TARGET FACTORS  
FROM THE NORMED COORDINATES OF THE VERTICES OF  
THE ENCLOSING TETRAHEDRON IN TERMS OF THE  
DRIFT-COMPENSATED PRINCIPAL FACTORS

Fig. 13

1400

FIG. 14

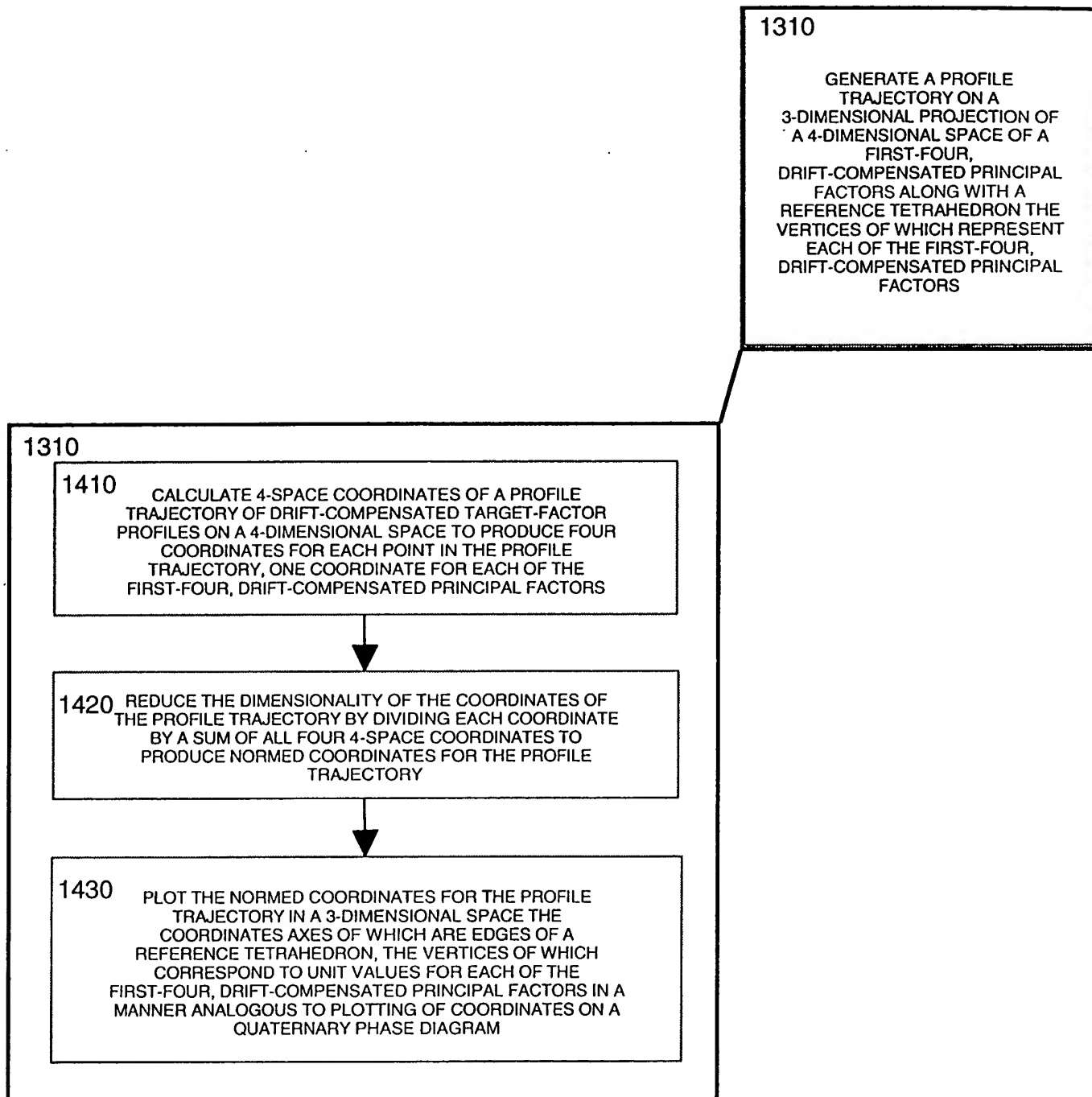


Fig. 14

1320 & 1330

ENCLOSE THE PROFILE TRAJECTORY WITHIN AN ENCLOSING TETRAHEDRON WITH VERTICES CENTERED ON END-POINTS AND IN PROXIMITY TO TURNING POINTS OF THE PROFILE TRAJECTORY, AND WITH FACES LYING ESSENTIALLY TANGENT TO PORTIONS OF THE PROFILE TRAJECTORY; AND, CALCULATE THE DRIFT-COMPENSATED TARGET FACTORS FROM THE NORMED COORDINATES OF THE VERTICES OF THE ENCLOSING TETRAHEDRON IN TERMS OF THE DRIFT-COMPENSATED PRINCIPAL FACTORS

1500

1320 & 1330

- 1510 PLACE VERTICES OF AN ENCLOSING TETRAHEDRON AT LOCI OF HEAVY POINT CONCENTRATIONS OF A PROFILE TRAJECTORY
- 1520 ADJUST THE EDGES OF AN ENCLOSING TETRAHEDRON TO LIE ALONG ESSENTIALLY STRAIGHT LINE SEGMENTS
- 1530 PLACE REMAINING VERTICES OF AN ENCLOSING TETRAHEDRON SO AS TO LIE NEAR THE TURNING POINTS OF THE PROFILE TRAJECTORY
- 1540 ADJUST THE FACES OF THE ENCLOSING TETRAHEDRON TO LIE ALONG CURVED SEGMENTS JOINING A TURNING POINT AND ESSENTIALLY STRAIGHT LINE SEGMENTS OF THE PROFILE TRAJECTORY

Fig. 15

1610  
 DISPLAY ON A COMPUTER MONITOR THE PROFILE TRAJECTORY OF THE PROJECTIONS OF A SEQUENCE OF ROW VECTORS AND THE REFERENCE TETRAHEDRON ESSENTIALLY SPANNING THE SPACE OF THE PROJECTIONS OF THE FIRST-FOUR, DRIFT-COMPENSATED PRINCIPAL FACTORS

1620  
 GENERATE AN ENCLOSING TETRAHEDRON BY STARTING WITH A COPY OF THE REFERENCE TETRAHEDRON AND MOVING ITS VERTICES TO ENCLOSE THE PROFILE TRAJECTORY USING SOFTWARE BASED ON METHODS WELL KNOWN IN THE ART OF THE DISPLAY OF GRAPHICALLY GENERATED COMPUTER OBJECTS

1630  
 DRAG THE VERTICES OF THE ENCLOSING TETRAHEDRON TO THE LOCI OF HEAVY POINT CONCENTRATIONS IN THE PROFILE TRAJECTORY

1640  
 DRAG ANY REMAINING VERTICES OF THE ENCLOSING TETRAHEDRON TO POSITION THEM IN THE VICINITY OF ANY TURNING POINTS IN THE PROFILE TRAJECTORY SO THAT ESSENTIALLY STRAIGHT LINE SEGMENTS LIE IN CLOSE PROXIMITY TO EDGES OF THE ENCLOSING TETRAHEDRON; AND, PLACE THE FACES OF THE ENCLOSING TETRAHEDRON ON OR IN CLOSE PROXIMITY TO ANY CURVED PORTIONS OF THE TRAJECTORY THAT CONNECT TURNING POINTS

1650  
 APPLY MINOR ADJUSTMENTS TO THE LOCATION OF THE VERTICES OF THE ENCLOSING TETRAHEDRON TO ENCLOSE THE SUBSPACE OF THE PROFILE TRAJECTORY WITH A MINIMAL VOLUME THAT BEST FITS THE DRIFT CORRECTED DATA REPRESENTED BY THE PROFILE TRAJECTORY, PROVIDING AN ENCLOSING TETRAHEDRON, THE VERTICES OF WHICH CORRESPOND WITH THE DRIFT-COMPENSATED TARGET FACTORS OF THE ANALYSIS

1660  
 DEFINE THE NORMED COORDINATES OF THE VERTICES OF THE ENCLOSING TETRAHEDRON RELATIVE TO THE REFERENCE TETRAHEDRON AS THE ENCLOSING-VERTEX WEIGHTING FACTORS USED TO OBTAIN THE DRIFT-COMPENSATED TARGET FACTORS FROM THE NORMALIZED FIRST-FOUR, DRIFT-COMPENSATED PRINCIPAL FACTORS

1670  
 OBTAIN THE VECTORS GIVING THE DRIFT-COMPENSATED TARGET FACTORS FOR EACH VERTEX OF THE ENCLOSING TETRAHEDRON BY SUMMING THE PRODUCTS OF EACH ENCLOSING-VERTEX WEIGHTING FACTOR WITH THE VECTOR GIVING THE NORMALIZED FIRST-FOUR, DRIFT-COMPENSATED PRINCIPAL FACTOR THAT CORRESPONDS TO EACH VERTEX OF THE REFERENCE TETRAHEDRON

Fig. 16

436

OUTPUT ANALYTICAL RESULTS  
SELECTED FROM THE GROUP  
CONSISTING OF A SET OF  
DRIFT-COMPENSATED SCALED  
TARGET-FACTOR PROFILES  
DERIVED FROM THE SET OF  
TARGET-FACTOR WEIGHTING  
FACTORS, AND THE SET OF  
DRIFT-COMPENSATED TARGET  
FACTORS

1700

436

1710

OBTAIN THE SET OF DRIFT-COMPENSATED TARGET-FACTOR  
PROFILE VALUES BY APPLYING THE SET OF  
DRIFT-COMPENSATED TARGET FACTORS TO THE PROFILE  
TRAJECTORY BY ASCERTAINING THE NORMED  
COORDINATES OF EACH POINT ON THE PROFILE  
TRAJECTORY, I.E. THE TARGET-FACTOR WEIGHTING  
FACTORS, FROM THE ENCLOSING TETRAHEDRON IN A  
MANNER ANALOGOUS TO FINDING COORDINATES OF A  
POINT ON A QUATERNARY PHASE DIAGRAM

1720

COMPOSE A REFERENCE VECTOR BY SUMMING THE  
PRODUCTS FROMED BY MULTIPLYING THE VECTORS  
CORRESPONDING TO THE DRIFT-COMPENSATED TARGET  
FACTORS BY THE TARGET-FACTOR WEIGHTING FACTORS,  
FOR EACH POINT ON THE PROFILE TRAJECTORY

1730

SCALE THE AMPLITUDE OF THE RESULTING REFERENCE  
VECTOR TO OPTIMALLY MATCH THE CORRESPONDING ROW  
VECTOR COMPENSATED FOR THE EFFECTS OF DRIFT

1740

DETERMINE A CORRESPONDING SCALING FACTOR AS THE  
SCALAR VALUE THAT OPTIMALLY MATCHES THE REFERENCE  
VECTOR TO THE ROW VECTOR

1750

MULTIPLY THIS SCALING FACTOR BY THE NORMED  
COORDINATES OF THE PROFILE TRAJECTORY, I.E. THE  
TARGET-FACTOR WEIGHTING FACTORS, TO OBTAIN THE  
PRODUCT OF EACH INDIVIDUAL TARGET-FACTOR WEIGHTING  
FACTOR WITH THE SCALING FACTOR, I.E. SCALED  
TARGET-FACTOR WEIGHTING FACTORS

1760

OUTPUT OR DISPLAY THE PROFILES AS A SET OF CURVES  
CORRESPONDING TO THE SCALED TARGET-FACTOR  
WEIGHTING FACTORS, I.E. DRIFT-COMPENSATED  
TARGET-FACTOR PROFILE VALUES, FOR EACH  
DRIFT-COMPENSATED TARGET FACTOR THAT CONTRIBUTES  
TO A PARTICULAR ROW VECTOR REPRESENTED BY A POINT  
ON THE PROFILE TRAJECTORY

Fig. 17

1800

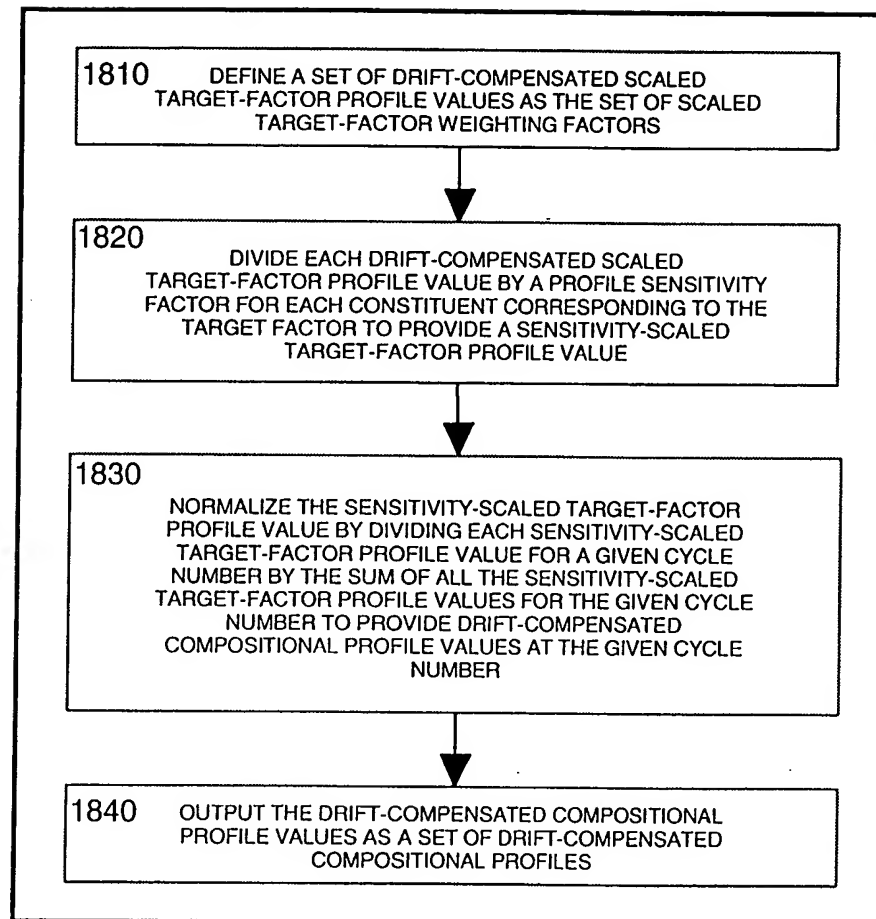


Fig. 18

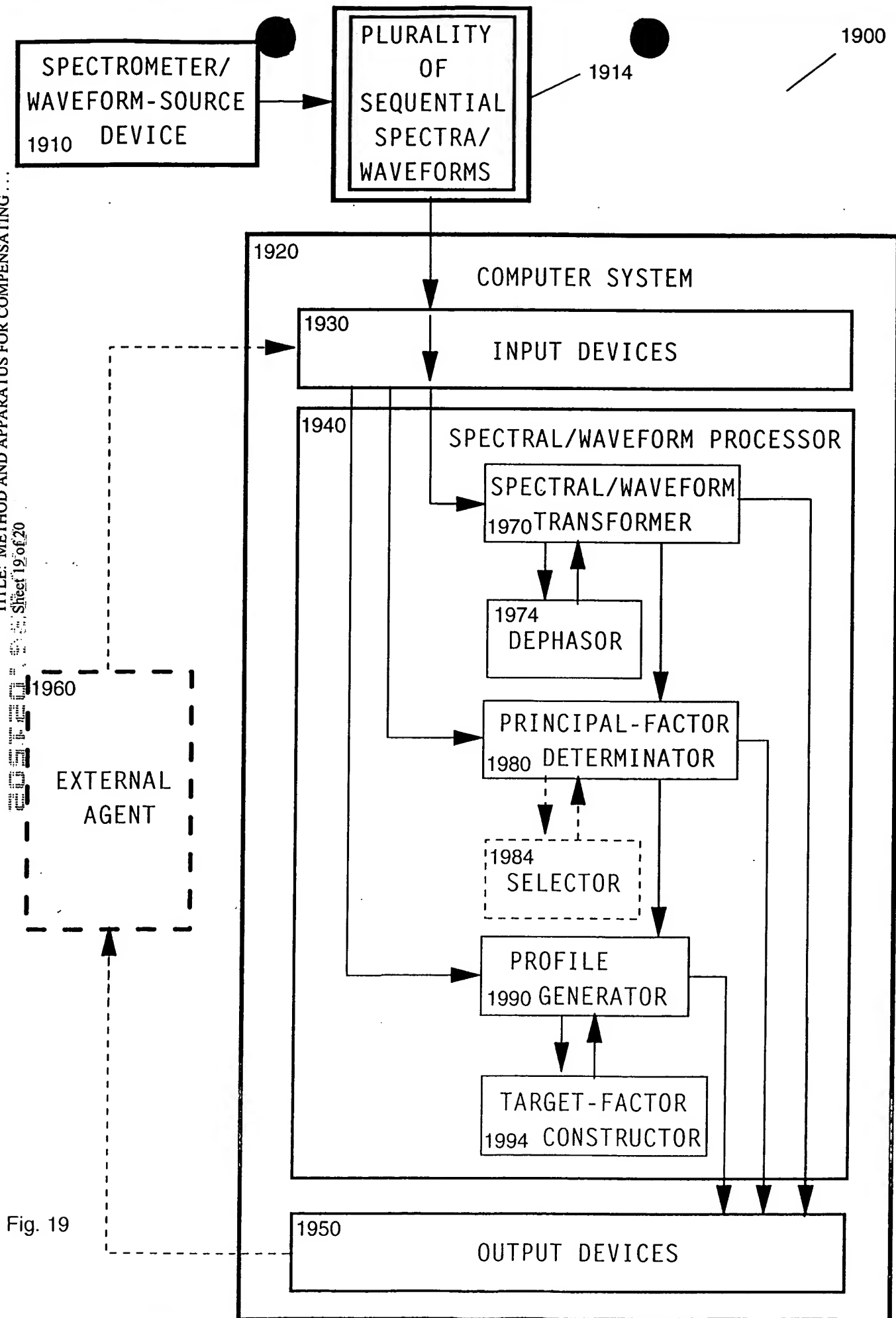


Fig. 19

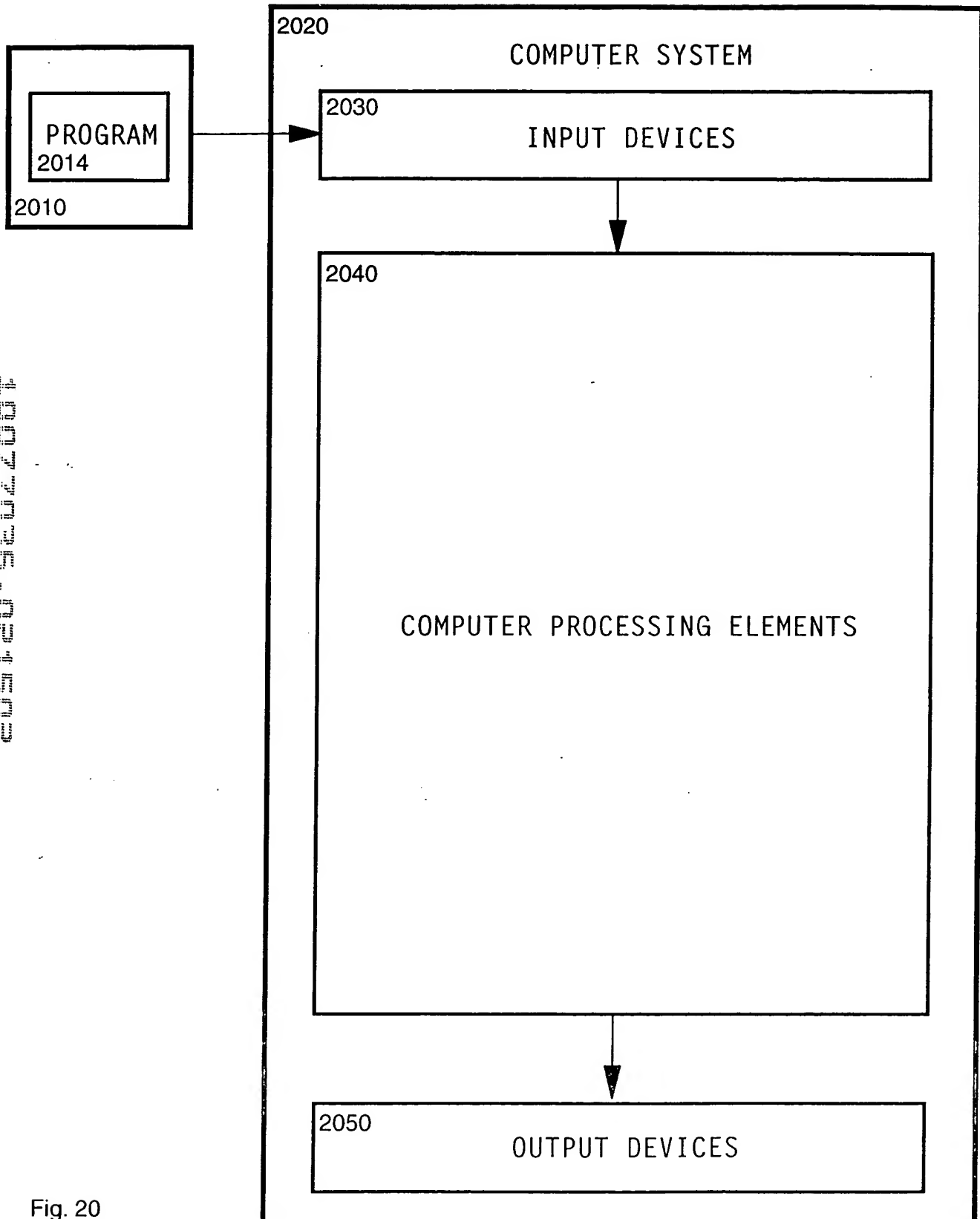


Fig. 20

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